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Deliver to: David E. Graybill, USPTO Art Group: 2827
Facsimile No.: 703-872-9306 Date: June 28, 2005
From: Thinh V. Nguyen, Reg. No. 42,034
Our Docket No.: 42390P7045D Number of pages 14 including this sheet.
Application No.: 09/874,666 Filing Date: 6/5/2001
Docket Due Date(s): 7/4/2005

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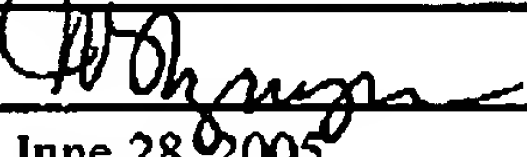
Date

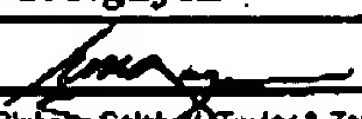
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| | | | |
|---|----|------------------------|-------------------|
| TRANSMITTAL FORM (to be used for all correspondence after initial filing) | | Application No. | 09/874,666 |
| | | Filing Date | June 5, 2001 |
| | | First Named Inventor | Suresh Ramalingam |
| | | Art Unit | 2827 |
| | | Examiner Name | David E. Graybill |
| Total Number of Pages in This Submission | 13 | Attorney Docket Number | 42390P7045D |

| ENCLOSURES (check all that apply) | | |
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| <input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Response <input type="checkbox"/> After Final <input type="checkbox"/> Affidavit/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> PTO/SB/08 <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Basic Filing Fee <input type="checkbox"/> Declaration/POA <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53 | <input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) | <input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input checked="" type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below): <div style="border: 1px solid black; height: 60px; width: 100%;"></div> |
| Remarks | | |

| SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT | |
|--|---|
| Firm or Individual name | Thinh V. Nguyen, Reg. No. 42,034 BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP |
| Signature |  |
| Date | June 28, 2005 |

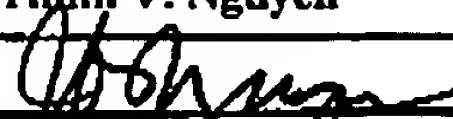
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Based on PTO/SB/21 (04-04) as modified by Blakely, Sokoloff, Taylor & Zafman (w/1) 06/04/2004.
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| | | | |
|--|--|--------------------------|-------------------|
| FEE TRANSMITTAL for FY 2005 <small>Patent fees are subject to annual revision.</small> | | <i>Complete if Known</i> | |
| | | Application Number | 09/874,666 |
| <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. | | Filing Date | June 5, 2001 |
| | | First Named Inventor | Suresh Ramalingam |
| TOTAL AMOUNT OF PAYMENT (\$) | | Examiner Name | David E. Graybill |
| | | Art Unit | 2827 |
| | | Attorney Docket No. | 42390P7045D |

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|---|--|
| METHOD OF PAYMENT (check all that apply) | |
| <input type="checkbox"/> Check <input type="checkbox"/> Credit card <input type="checkbox"/> Money Order <input type="checkbox"/> None <input type="checkbox"/> Other (please identify): _____ | |
| <input checked="" type="checkbox"/> Deposit Account Deposit Account Number: <u>02-2666</u> Deposit Account Name: <u>Blakely, Sokoloff, Taylor & Zafman LLP</u> | |
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| FEE CALCULATION | | | | | |
|---------------------------|----------|--------------|----------|--|-------------|
| Large Entity | | Small Entity | | Fee Description | Fee Paid |
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet. | |
| 2053 | 130 | 2053 | 130 | Non-English specification | |
| 1251 | 120 | 2251 | 60 | Extension for reply within first month | |
| 1252 | 450 | 2252 | 225 | Extension for reply within second month | |
| 1253 | 1,020 | 2253 | 510 | Extension for reply within third month | |
| 1254 | 1,590 | 2254 | 795 | Extension for reply within fourth month | |
| 1255 | 2,160 | 2255 | 1,080 | Extension for reply within fifth month | |
| 1401 | 500 | 2401 | 250 | Notice of Appeal | |
| 1402 | 500 | 2402 | 250 | Filing a brief in support of an appeal | |
| 1403 | 1,000 | 2403 | 500 | Request for oral hearing | |
| 1451 | 1,510 | 2451 | 1,510 | Petition to institute a public use proceeding | |
| 1460 | 130 | 2460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 1809 | 790 | 1809 | 395 | Filing a submission after final rejection (37 CFR § 1.129(a)) | |
| 1810 | 790 | 2810 | 395 | For each additional invention to be examined (37 CFR § 1.129(b)) | |
| Other fee (specify) _____ | | | | | |
| SUBTOTAL (2) | | | | | (\$) |

| | | | |
|---------------------|---|-----------------------------------|----------------|
| SUBMITTED BY | | <i>Complete (if applicable)</i> | |
| Name (Print/Type) | Thinh V. Nguyen | Registration No. (Attorney/Agent) | 42,034 |
| Signature |  | Telephone | (714) 557-3800 |
| | | Date | 06/28/05 |

Based on PTO/SD-17 (12-04) as modified by Blakely, Sokoloff, Taylor & Zafman (wtr) 12/15/2004
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| | | | |
|--|--|--------------------------|-------------------|
| FEE TRANSMITTAL for FY 2005 <small>Patent fees are subject to annual revision.</small> | | <i>Complete if Known</i> | |
| | | Application Number | 09/874,666 |
| <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. | | Filing Date | June 5, 2001 |
| | | First Named Inventor | Suresh Ramalingam |
| TOTAL AMOUNT OF PAYMENT (\$) | | Examiner Name | David E. Graybill |
| | | Art Unit | 2827 |
| | | Attorney Docket No. | 42390P7045D |

METHOD OF PAYMENT (check all that apply)

☐ Check
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☒ Deposit Account Deposit Account Number: 02-2666
 Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP


For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

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FEE CALCULATION

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|---------------------------|----------|--------------|----------|--|------------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet. | |
| 2053 | 130 | 2053 | 130 | Non-English specification | |
| 1251 | 120 | 2251 | 60 | Extension for reply within first month | |
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| 1253 | 1,020 | 2253 | 510 | Extension for reply within third month | |
| 1254 | 1,590 | 2254 | 795 | Extension for reply within fourth month | |
| 1255 | 2,160 | 2255 | 1,080 | Extension for reply within fifth month | |
| 1401 | 500 | 2401 | 250 | Notice of Appeal | |
| 1402 | 500 | 2402 | 250 | Filing a brief in support of an appeal | |
| 1403 | 1,000 | 2403 | 500 | Request for oral hearing | |
| 1451 | 1,510 | 2451 | 1,510 | Petition to institute a public use proceeding | |
| 1460 | 130 | 2460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 1809 | 790 | 1809 | 395 | Filing a submission after final rejection (37 CFR § 1.129(a)) | |
| 1810 | 790 | 2810 | 395 | For each additional invention to be examined (37 CFR § 1.129(b)) | |
| Other fee (specify) _____ | | | | | |
| SUBTOTAL (2) | | | | | (\$) _____ |

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|---------------------|---|-----------------------------------|----------------|
| SUBMITTED BY | | <i>Complete (if applicable)</i> | |
| Name (Print/Type) | Thinh V. Nguyen | Registration No. (Attorney/Agent) | 42,034 |
| Signature |  | Telephone | (714) 557-3800 |
| | | Date | 06/28/05 |

Based on PTO/SB/17 (12-04) as modified by Blakely, Sokoloff, Taylor & Zafman (wtr) 12/15/2004.
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Docket No.: 042390.P7045D

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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|---|--|
| In re Application of: Suresh Ramalingam et al. Application No.: 09/874,666 Filed: June 5, 2001 For: A CONTROLLED COLLAPSE CHIP CONNECTION (C4) INTEGRATED CIRCUIT PACKAGE WHICH HAS TWO DISSIMILAR UNDERFILL MATERIALS | Examiner: David E. Graybill Art Group: 2827 |
|---|--|

REPLY BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicants submit the following Reply Brief pursuant to 37 C.F.R. §41.41 for consideration by the Board of Patent Appeals and Interferences. Please charge any additional fees or credit any overpayment to our deposit Account No. 02-2666. A duplicate copy of the Fee Transmittal is enclosed for this purpose.

042390.P7045D
App. No. 09/874,666

1

TVN/tn

REMARKS/COMMENTS

In response to the Examiner's Answer dated May 4, 2005, Applicants respectfully submit the Reply Brief.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Applicants acknowledge that after the Appeal Brief was filed, the Examiner have withdrawn the following grounds of rejection:

1. Claims 7-14 and 31-35 under 35 U.S.C. §112, first paragraph;
2. Claims 7-14 and 31-35 under 35 U.S.C. §112, second paragraph;
3. Claims 7, 8, 10-14 and 31-35 under 35 U.S.C. §102(b) as being anticipated by Ameen (0340492); and,
4. Claims 7, 8, 10-14 and 31-35 under 35 U.S.C. §103(a) as being unpatentable over Ameen (03404902).

Therefore, the grounds of rejection to be reviewed on appeal are:

1. Claims 7-8, 10-14, and 31-35 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Ameen in view of Applicant's admitted prior art (AAPA)
2. Claim 9 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Ameen in view of AAPA and further in view of Desai and Lewis.

VII. ARGUMENTS

Claims 7-14 and 31-35 Are Not Obvious Over Ameen, In View Of Admitted Prior Art (for claims 7-8, 10-14, and 31-35), And Further In View Of Desai and Lewis (for claim 9).

The Examiner rejects claims 7, 8, 10-14, and 31-35 under 35 U.S.C. §103(a) as being unpatentable over Ameen in view of Applicant's admitted prior art (AAPA), and claim 9 as being unpatentable over Ameen in view of AAPA and further in view of Desai and Lewis. Applicants respectfully disagree and contend that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP §2143, p. 2100-129 (8th Ed., rev. 2, May 2004). Applicants respectfully contend that there is no suggestion or motivation to combine their teachings and that no *prima facie* case of obviousness has been established.

1. Claims 7, 8, 10-14, and 31-35:

The Examiner rejected claims 7, 8, 10-14, and 31-35 under 35 U.S.C. 103(a) as being unpatentable over Ameen and in combination with Applicant's admitted prior art (AAPA). Applicants note that page 5 of the Examiner's Answer states that "claims 7, 8, 9-14 and 31-35 stand rejected". Applicants believe that the claim numbers should be 7, 8, 10-14, and 31-35. Applicants respectfully disagree and contend that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

Ameen and AAPA, taken alone or in combination, does not disclose, suggest, or render obvious (1) dispensing a first material to form an underfill which becomes attached to the integrated circuit and the substrate, and (2) dispensing a second material to form a circumferential fillet, the second material being different than the first material and having a lower adhesive property than the first material.

Ameen does not disclose any of the above elements as discussed above. AAPA merely discloses two types of materials, SEMICOAT 5230JP and SEMICOAT 122X. AAPA does not disclose, suggest or render obvious using these two materials as an underfill and a circumferential fillet having different adhesive properties.

Ameen discloses conformal sealing and interplanar encapsulation of electronic device structures. An integrated circuit (IC) chip 4 is mounted on a substrate 12 (Ameen, col. 6, lines 23-25; Figures 2 and 3). An overcoat polymeric material 44 is deposited to conformally coat the back face 14 of chip 4 and the top surface 20 of substrate 12 beyond the peripheral edge 46 of chip 4 (Ameen, col. 8, lines 14-20). To further enhance the environmental isolation of the structures, an undercoat or interplanar polymeric material is deposited to substantially fill the space 41 between the chip 4 and the substrate 12.

Ameen is well aware of adhesion properties of the liquid polymeric materials, but merely discloses that the undercoat material should have good adhesion to the wetted surfaces after curing (Ameen, col. 13, lines 10-11). Ameen does not disclose or suggest that the second material has a lower adhesion property than the first material. In fact, Ameen discloses or suggests the opposite. Ameen discloses to use the same material for both overcoat and undercoat:

"... it may be desirable to [appropriately] adjust the properties of the solvent-free liquid overcoat polymeric material so that it will conformally coat the back of the electronic device, flow down the edge of the device onto the substrate surface and into the space between the electronic device and substrate. This will result in *a single deposition* of a substantially solvent-free liquid polymer which after curing forms a substantially void-free material conformally coating the back of the device, sealing the space between the device and the substrate at the periphery of the device, *and* substantially filling the space between the device and substrate." (Ameen, col. 13, lines 55-58; col. 14, lines 1-10, emphasis added)

As clearly seen from this paragraph, Ameen discloses using the same material for both the overcoat and the undercoat.

Ameen is well aware of adhesion properties of the liquid polymeric materials, but silent on the different adhesion properties between the overcoat and undercoat. This fact indicates that it was not obvious to Ameen or one skilled in the art that the second material has a lower adhesion property than the first material. Furthermore, Ameen discloses using the same material for both overcoat and undercoat in a single deposition of a substantially solvent-free liquid polymer. This further indicates that Ameen is teaching away from the claimed invention.

It is improper to combine references where the references teach away from their combination. In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Furthermore, although a

prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." In re Mills 916 F.2d at 682, 16 USPQ2d at 1432; In re Fitch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992).

Here, not only Ameen does not disclose or suggest the second material having a lower adhesion property than the first material, but Ameen also teaches away from this. Therefore, it is improper to combine Ameen with any other references. The AAPA merely discloses the SEMICOAT series as exemplary materials to be used. AAPA does not disclose or suggest using the SEMICOAT series as first and second materials to form an underfill and a circumferential fillet, respectively, such that the second material is different than the first material and has a lower adhesive property. In fact, AAPA merely discloses using the material singly as an underfill for flip chip (Appeal Brief, Evidence Appendix, page 8 of Shin Etsu SEMICOAT Series).

In the Examiner's Answer, the Examiner admits that Ameen does not appear to explicitly disclose the second materials having a lower adhesive and adhesion property than the first material (Examiner's Answer, page 7, lines 15-17). The Examiner then goes on to discuss AAPA and states that "it would have been obvious to use the prior art SEMICOAT 5230JP polymeric epoxy underfill material as the polymeric and/or epoxy material of Ameen." (Examiner Answer, page 8, lines 16-22; page 9, lines 1-4). However, the issue is not whether SEMICOAT 5230J can be used as an underfill. The issue is whether the second material is different than the first material and has a lower adhesive property. The Examiner admits that Ameen does not disclose this aspect, but then fails to show that AAPA discloses or suggests the stated limitation.

2. Claim 9:

In the final Office Action, the Examiner rejected claim 9 under 35 U.S.C. 103(a) as being unpatentable over Ameen or the combination of Ameen and Applicant's admitted prior art ("AAPA") and further in combination with U.S Patent Application No. 6,166,434 issued to Desai ("Desai") and U.S Patent Application No. 6,020,579 issued to Lewis ("Lewis"). Applicants respectfully disagree and contend that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

Desai discloses a die clip assembly for semiconductor package. An underfill material is dispensed into the remaining space (or "gap") between the die and the substrate (Desai, col. 1, lines 65-67; col. 2, lines 1-5).

Lewis discloses a microwave applicator having a mechanical means for tuning. An applicator includes a conveyor belt passing through center openings. Such a system may be utilized to cure or dry coat solder masks, to die attach adhesives or to underfill (Lewis, col. 8, lines 12-21).

Ameen, AAPA, Desai, and Lewis, taken alone or in any combination, do not disclose, suggest, or render obvious (1) dispensing a first material to form an underfill which becomes attached to the integrated circuit and the substrate, (2) dispensing a second material to form a circumferential fillet, the second material being different than the first material and having a lower adhesive property than the first material, and (3) wherein the substrate moves within an oven while the first material flows between the integrated circuit and the substrate.

None of them discloses (1) and (2) as discussed above. Desai merely disclose the underfill material being dispensed between the die and substrate, not the substrate moving within an oven. Lewis merely discloses a system cure soldermask or to attach adhesives, or to underfill, not the substrate moving within an oven.

Accordingly, claims 7-14 and 31-35 are distinguishable over the cited prior art references.

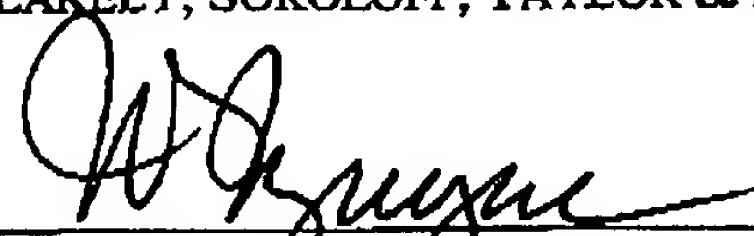
VIII. CONCLUSION

Applicants respectfully request that the Board enter a decision overturning the Examiner's rejection of all pending claims, and holding that the claims are not obvious by the prior art.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: June 28, 2005


THINH V. NGUYEN
Reg. No. 42,034

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Los Angeles, CA 90025-1026
(714) 557-3800

IX. CLAIMS APPENDIX

The claims of the present application which are involved in this appeal are as follows:

- 1.-6. (canceled)
7. (previously presented) A process for underfilling an integrated circuit that is mounted to a substrate, comprising:
dispensing a first material to form an underfill which becomes attached to the integrated circuit and the substrate; and,
dispensing a second material to form a circumferential fillet, the second material being different than the first material and having a lower adhesive property than the first material and becoming attached to the integrated circuit and the substrate.
8. (previously presented) The process as recited in claim 7, wherein the first material flows between the integrated circuit and the substrate.
9. (previously presented) The process as recited in claim 8, wherein the substrate moves within an oven while the first material flows between the integrated circuit and the substrate.
10. (previously presented) The process as recited in claim 7, wherein the second material is dispensed in a pattern which surrounds the first material.
11. (previously presented) A process for underfilling an integrated circuit that is mounted to a substrate comprising:
heating the substrate before a first material is dispensed;
dispensing the first material to form an underfill, the first material becoming attached to the integrated circuit and the substrate; and,
dispensing a second material to form a circumferential fillet, the second material being different than the first material and having a lower adhesive property than the first material and becoming attached to the integrated circuit and the substrate.

12. (previously presented) The process as recited in claim 11, further comprising heating the first material to a gel state.

13. (previously presented) The process as recited in claim 12, wherein the substrate is heated to a temperature that is greater than a temperature for heating said first material to said gel state.

14. (previously presented) The process as recited in claim 11, further comprising mounting the integrated circuit to the substrate with a solder bump before the first material is dispensed.

15.-30. (canceled)

31. (previously presented) A process for underfilling an integrated circuit that is mounted to a substrate comprising:

heating the substrate before a first material is dispensed;

dispensing the first material to form an underfill, the first material becoming attached to the integrated circuit and the substrate; and,

dispensing a second material around a periphery of the integrated circuit to form a circumferential fillet, the second material being different than the first material and having a lower adhesion property than the first material and becoming attached to the integrated circuit and the substrate.

32. (previously presented) The process as recited in claim 31, further comprising heating the first material to a gel state.

33. (previously presented) The process as recited in claim 32, wherein the substrate is heated to a temperature that is greater than a temperature for heating the first material to a gel state.

34. (previously presented) The process as recited in claim 33, wherein the first material is heated to a temperature ranging between 120 degrees Celsius to 145 degrees Celsius.

35. (previously presented) The process as recited in claim 31, wherein the dispensing of the second material is at a temperature ranting between 80 degrees Celsius and 120 degrees Celsius.